Stellar PV

Project Clean Wafers

Australian Made Solar Ingots & Wafers

Interim Knowledge Sharing Report
November 2025

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Project Information	
Company	Stellar PV Pty Ltd
Project Name	Project Clean Wafers
Report Date	05 December 2025
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The project received funding from the Australian Renewable Energy Agency (ARENA) as part of ARENA's Solar Sunshot Program.

Stellar PV acknowledges the Traditional Custodians of the lands on which we work and operate — the Gadigal people of the Eora Nation in Sydney, the Kuringgai people of the Ku-ring-gai area, the Wulgurukaba and Bindal peoples of Townsville and the Calcium region of North Queensland, and the Turrbal and Yuggera peoples of Brisbane. We pay our deepest respects to Elders past and present, and we recognise the enduring connection of all First Nations peoples to Country, culture, and community.

Executive Summary

Project Clean Wafers is a pioneering initiative led by Stellar PV to assess the feasibility of establishing Australia's first large-scale silicon ingot pulling and wafer manufacturing facility, near Townsville, Queensland.

Supported by ARENA under the Solar Sunshot program, the project addresses a critical gap in both Australia's and the world's solar value chains.

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Recent geopolitical and policy developments are reshaping the solar industry, as major economies seek to diversify manufacturing and strengthen the resilience of clean-energy supply chains. At the same time, wafer demand – particularly in the U.S. – is expected to far exceed planned domestic supply over the coming years, creating a clear opportunity for new, trusted manufacturing bases such as Australia. Globally, more than 97% of solar wafer production is concentrated in China.

Project Clean Wafers represents an opportunity for Australia to re-enter the global solar manufacturing landscape – leveraging its abundant renewable-energy resources, critical-minerals base, and long record of solar innovation. The project explores how Australia can contribute to a more diverse, transparent and low-emissions global supply chain while building sovereign capability in advanced clean-energy manufacturing.

The project is being delivered in two stages: Pre-Feasibility Review (Stage 1) and a Feasibility Study including Front-End Engineering Design (Stage 2). The scope covers technical feasibility, economic viability, environmental impact, workforce development, engineering design and community engagement.

Stage 1 has now been completed. Key activities included securing a site option to lease, equipment vendor shortlisting, the early factory design and costing of a 2 GW facility, desktop site and infrastructure studies, market analysis and engagement with potential offtake partners, and development of initial Environmental, Social, and Governance (ESG) and community benefit frameworks.

The findings from the Pre-Feasibility Review indicate that a 2 GW ingot pulling and wafering facility is technically and commercially achievable, based on preliminary data and assumptions, with no material environmental, regulatory or site-related barriers identified that would limit progression to the next stage of the feasibility study.

These findings are reinforced by strong policy and market tailwinds, as Australian, U.S. and European initiatives converge to accelerate clean-energy manufacturing, secure solar supply chains and expand critical-mineral processing. This policy alignment provides a strategic window of opportunity for domestic wafer production, strengthening investor confidence and positioning Australia as a trusted partner in the global energy transition.

These outcomes provide a solid foundation for Stage 2, which will deliver feasibility study, Front-End Engineering Design (FEED), detailed environmental and geotechnical assessments, and preparation and submission of Development Applications for the facility. Stage 2 will also deepen community and First Nations engagement, refine financial modelling and risk management, and advance negotiations toward formal offtake agreements.

The outcomes of Stage 2 will guide Stellar PV and its partners in determining the pathway toward full facility development and long-term operations.

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01. Our Company & Vision

About Stellar PV

Stellar PV is an Australian-led venture developing the nation's first large-scale manufacturing facility for silicon ingots and wafers for the global solar photovoltaic (PV) industry. A pre-feasibility review has been completed, progressing to full feasibility study and front-end engineering design (FEED) in 2026, Stellar PV is laying the groundwork for sovereign solar manufacturing with global relevance.

Led by global PV experts

Backed by decades of experience building solar manufacturing facilities across Asia, Europe and North America.

Advanced Australian manufacturing

Designed to produce premium silicon wafers highly desirable in both local and global clean-energy markets.

Utilising Australia's sunshine for low-cost production

Powered by behind-the-grid renewable energy, enabling low-cost electricity for the factory and globally-competitive clean-energy manufacturing.

Delivering an alternative supply chain for the global market

Providing a traceable, sustainable and resilient solar manufacturing pathway across the value chain.

Our vision

Build Australia's First Solar Wafer Manufacturing	Being first to market in Australia and a world-leader outside of China brings early adopter competitive advantages.
Support International Supply Chain Diversification	Providing reliable, high-quality wafers as an alternative to China-centric supply chains — supporting U.S. and European solar cell manufacturers.
Advance Global Decarbonisation	Accelerating the clean energy transition through a sustainable and traceable wafer supply for next-generation solar technologies.
Leverage Global Expertise	Led by a team with decades of experience building large-scale PV manufacturing facilities.

Image: Computer generated images of a silicon ingot, a silicon wafer and polysilicon.

Building an Australian Solar Manufacturing Industry

01

Building Australian Solar Manufacturing

Stellar PV's solar wafer manufacturing facility will play a pivotal role in evolving the Australian solar panel ecosystem, building a crucial step in the highly technical value chain and supporting broader G7 critical minerals priorities to diversify and secure clean-energy supply chains.

02

Extending Australia's Solar Value Chain

Rock quartz is mined in Australia, and we produce metallurgical silicon here too.

There is a new metallurgical silicon plant in development and feasibility studies in progress for two polysilicon plants in Australia.

If a polysilicon plant goes ahead in Australia, it would provide direct inputs to our wafer facility and extend the value chain from rock quartz, through to wafers in Australia.

03

Aligning with National & State Priorities

The project aligns with Australia's national industrial policy objectives – particularly the *Future Made in Australia* initiative and the *Critical Minerals Strategy,* and Queensland's *Transforming Queensland Manufacturing Strategy 2035-30* – which together seek to strengthen sovereign manufacturing capability, grow clean-energy and critical minerals value chains, attract investment and build a globally competitive, future-ready manufacturing industry.

Image: The solar value chain – from rock quartz to finished module.

Experienced Leadership Team

Strong leadership team with deep experience in global photovoltaic manufacturing and a proven track record of success in Australia and internationally.

Ted Szpitalak
CSO, Principal and Founding Partner

From Martin Green's original UNSW solar research team in the 1980s, Ted was Founder/CTO of China's first three major PV factories in the 2000s and established globally significant solar production lines.

Louise Hurll
CEO, Founding Partner

CFO/COO at private equity funds and family offices (Sydney/London). Comprehensive strategy and operational experience with strong financial, cash flow and global tax and legal structuring.

Previous Experience & Past Affiliations of Our Team:

PacificSolar
SUNTECH
JA SOLAR
Sunrise Global Solar Energy
Silfab
SILFAB SOLAR
UNSW SYDNEY

Ted Szpitalak's Legacy: From UNSW Innovation to Global Impact

We've been part of the solar story since the 1980s, when Australian innovation laid the groundwork for modern solar technology. In the early 2000s, that expertise helped spark the rise of China's solar manufacturing industry, creating the foundation for today's global solar supply chain. Building on those trusted international relationships, we're now bringing advanced manufacturing capability back to Australia.

A note from Ted Szpitalak

My solar journey started forty-three years ago when Martin Green asked me to join his PV research facility at the University of NSW.

Back in those days, we had to beg, borrow and steal to get the program started and to transfer the technology to the initial Research and Development (R&D) solar panels, which were made right here in Sydney.

Our ground-breaking discoveries in high-efficiency cell technologies, and our and ability to develop them into commercially viable solar panels, created the roadmap for solar as the significant, global, renewable energy source it has become.

At the time, we could see the benefits of Chinese production, so we helped develop large-scale solar manufacturing facilities there with Suntech, Nanjing PV Tech, and JA Solar. These pioneering companies kick-started the globally important solar industry that we know today.

We tried to bring the technology home to Australia in the late 2000s, but were told: 'Go back to China, we don't do manufacturing in Australia anymore!'.

So, we all moved to Taiwan and have since started multiple PV factories in Taiwan, North America, and Germany.

Fast forward to the present… Stellar PV was established in 2023 to leverage our global solar manufacturing success and bring it back home to Australia.

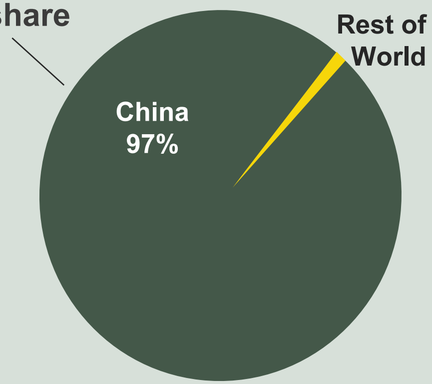
We're excited to be building Stellar PV's large-scale silicon ingot and wafer facility in Australia with such a globally experienced team.

Image: Members of the original UNSW led by Prof. Martin Green (front centre). Ted Szpitalak (left, second from top). Courtesy of the UNSW archives.

02. Australia's Opportunity & Global Market Context

The Global Opportunity

Chinese global solar wafer manufacturing market share



01

Concentrated supply chain

The global solar wafer market is highly concentrated with over 97%[1] of global wafer supply being manufactured in China.

02

Policy-driven diversification

However, new opportunities are emerging due to global geopolitical tensions, including the U.S. and EU's desire for high ESG standards and auditable, secure and diversified supply chains[2,3].

03

Growing opportunity

There is significant additional solar cell manufacturing planned in the next three years in the U.S. alone[4,5], much of this requires secure supply of high-quality wafers without trade barriers.

In addition, tariffs and trade barriers in the U.S. and EU present a rare and timely opportunity for Australia to take a leading role and produce solar wafers that meet these high standards.

1. IEA PVPS Trends in Photovoltaic Applications (2025)
2. US Department of Energy (2024)
3. Bruegel policy brief (2024)
4. Solar Energy Industries Association (SEIA) (2024)
5. Clean Energy Associates (CEA) (2025)

Full reference details available in the Appendix

Global PV Market: Demand Continues to Grow

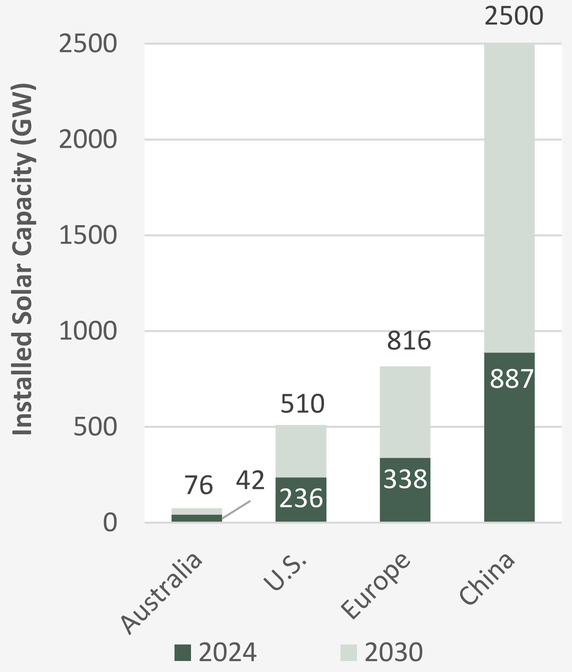
It took 68 years to reach the first 1 TW of global installed solar PV capacity – and only two years to double it.[1]

Global cumulative installed solar PV installations surpassed 2 TW in 2024, marking a shift into a new era of rapid deployment. Consistent with this trajectory, leading forecasts indicate a substantial expansion to 6–7 TW globally by 2030[2,3,4]

Achieving these outcomes requires an additional 4–5 TW of solar PV installed this decade, with annual installations accelerating towards 1 TW per year by 2030. More bullish outlooks indicate that annual installations could climb even higher, approaching 1.9 TW per year by 2029[5]. This scale-up highlights the significant and sustained demand for solar modules and the corresponding need for expanded production of upstream components such as polysilicon, ingots and wafers.

Major markets project huge growth in PV installations

Region	2024 Installed Solar Capacity	2030 Projected Solar Capacity
China	887 GW[6]	2,500 GW[7]
Europe	338 GW[8]	816 GW[8]
United States	236 GW[9]	510 GW[9]
Australia	42 GW[10]	76 GW[11]



Key drivers of ongoing demand for solar PV installations

01
Low cost
Declining installation costs and low cost of electricity generation make solar PV one of the cheapest energy sources available.

02
Technology advances
Ongoing improvements in module efficiency, durability and system performance are increasing confidence and accelerating adoption.

03
Energy security
Growing demand for reliable, domestically sourced alternatives to volatile global oil and gas markets.

04
Rooftop solar
Household and commercial uptake of rooftop PV and battery systems is growing rapidly, supported by falling prices and consumer preferences.

05
Government policy
Subsidies, tax incentives and supportive regulatory frameworks in major markets are encouraging further uptake.

06
Global agreements
International climate commitments – including the Paris Agreement, national net-zero targets and the COP28 pledge to triple renewable capacity are reinforcing long-term demand.

1. Global Solar Council (2024)
2. BNEF via Ember (2025)
3. Solar Power Europe (2025)
4. International Energy Agency (2024)
5. Bernreuter Research (2025)
6. PV Magazine (2025)
7. IWR via CleanTechnica (2025)
8. Solar Power Europe (2024)
9. SEIA (2025)
10. APVI (2025)
11. International Energy Agency (2024)
Full reference details available in the Appendix

Global Solar Wafer Market

The global solar wafer market refers specifically to the production of solar-grade silicon wafers for the PV industry – distinct from the semiconductor wafer supply chain and driven by rapidly expanding PV demand. All reference to "wafers" in this report refer to solar-grade PV wafers only.

1 Current production dominated by China

- Global solar wafer production has expanded at exceptional speed – rising from 381 GW in 2022 to 682 GW in 2023 and 804 GW in 2024 – with almost all of this growth occurring in China. The wafer market is currently valued at approximately USD 15 billion[1].
- In 2024, China produced 776 GW of wafers, representing approximately 97% of global output [1].
- China is expected to maintain high production despite significant overcapacity, re-enforcing global supply chain risk and the need for diversified, resilient wafer production in other regions.

2 Production outside China is growing

- Non-Chinese wafer production remains small but is expanding from a very low base.
- Announced wafering projects in the U.S., India, Europe and S.E. Asia could deliver up to 70 GW of capacity in the next 2-3 years, depending on policy support.
- Even with growth, non-Chinese production is expected to remain small compared to China's scale.

3 Changing global landscape

- Growing recognition of supply-chain concentration risks is reshaping upstream PV strategies, as policymakers and industry acknowledge reliance on a single region for nearly all wafer supply.
- Strong industrial policies (U.S. Inflation Reduction Act (IRA), India Production Linked Incentive (PLI), EU Net-Zero Industry Act (NZIA) are incentivising new regional manufacturing and upstream diversification.
- ESG requirements, trade measures, and national security policies are now major drivers of efforts to build more diversified, resilient wafer supply chains.

Future wafer supply outside of China expected to come from:

01
India
17 GW planned, all to fill local demand for PV.

02
Indonesia and Vietnam
20 GW planned. Likely high U.S. tariffs on supply due to Chinese influence.

03
U.S.
Expanding by 6 GW in 2025 but no further plans for production. Looking for alternative supply chains.

04
Europe
Planning 25 GW. Development headwinds include slow policymaking and high-power prices.

05
Australia
2 GW plugging the EU and U.S. supply chain gaps.

Source: Stellar PV research

1. IEA PVPS Trends in Photovoltaic Applications 2025

U.S. Wafer Supply Outstripped by Demand

Current wafer manufacturers:

The U.S. currently has only two wafer manufacturers. Corning's 6 GW facility became operational in October 2025,[1] and Q-Cells is constructing a 3.3 GW wafer line that is not yet online[2]. Both manufacturers have already secured commitments for the majority of their future production:

Corning (6 GW) – Approximately 5 GW (around 80%) has been contracted to a Tier-1 U.S. cell manufacturer under long-term supply agreements.[1]

Q-Cells (3.3 GW under construction) – All output is expected to be used internally within their factory which is vertically integrated across ingot, wafer, cell and module.[2]

Planned manufacturing in next 2-3 years:

Additional U.S. wafer manufacturing plants such as those proposed by Cubic and Norsun, have been suspended,[3,4] with no future U.S. production planned.

The chart to the right shows the production capacity of U.S. wafer, cell and module facilities that are either currently operational/under construction (dark green) or planned to be operational within a timeframe of 2 or 3 years (light green). The chart excludes thin film cell manufacturers, as they do not use wafers in their manufacturing process. Capacity figures are based on our research and analysis of publicly available announcements.

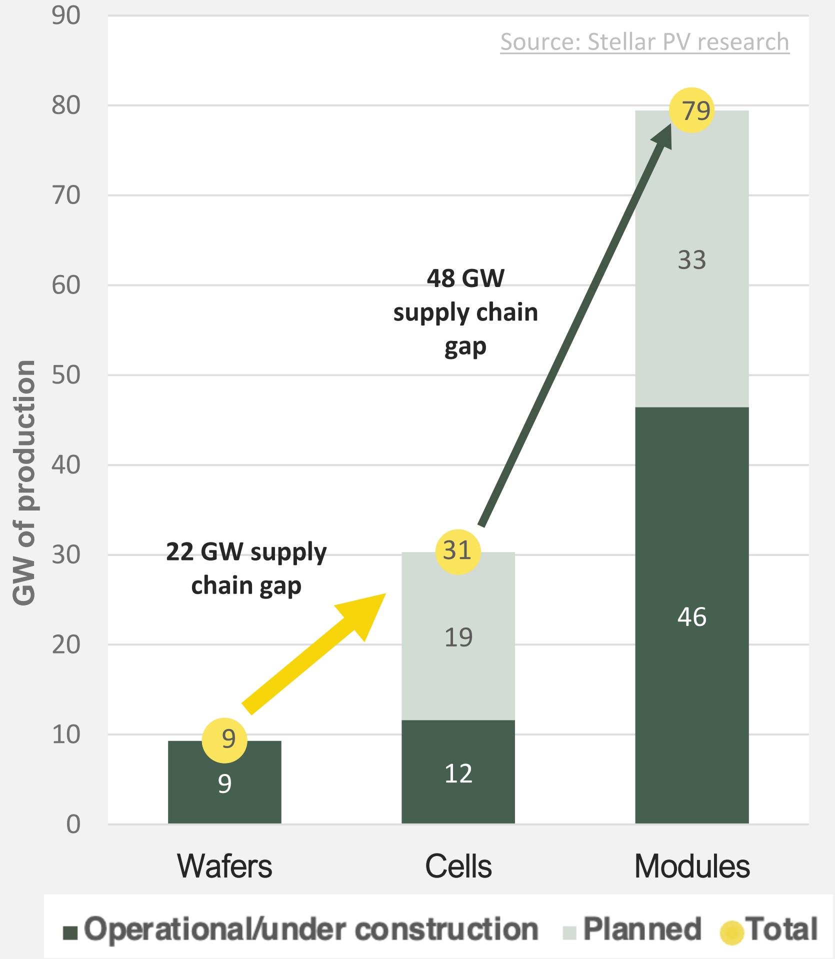
Cell manufacturing capacity is likely to increase by 19 GW, to a total of approximately 31 GW.

This creates a supply chain gap of 3 GW currently, and anticipated gap of 22 GW in the next few years, a gap that Stellar PV are actively planning to fill.

1. Taiyang News (2024)
2. Hanwha Qcells (2025)
3. Reuters (2025)
4. The Washington Post (2025)

Full reference details available in the Appendix

U.S. supply chain gap for wafers growing from 3 GW to 22 GW in the next 2-3 years



U.S. Geopolitics and Policies Creating Positive Tailwinds for Australian Wafer Manufacturing

The U.S. has enacted multiple policies to support domestic solar manufacturing, including tariffs on imports, production tax credits, and foreign entity of concern (FEOC) restrictions.

These policies have intensified over the past year, with tariffs and supply chain restrictions becoming more stringent to favour domestic production.

These changes make Chinese and SE Asian wafers more expensive for U.S. cell manufacturers, creating favourable pricing conditions for Stellar PV's exports to the U.S. market.

IRA, OBBBA, FEOC and Tariffs

- The Inflation Reduction Act (IRA) – as amended under the One Big Beautiful Bill Act (OBBBA) – remains the primary driver of U.S. clean-energy manufacturing incentives.
- While OBBBA scaled back or tightened several provisions[1], the IRA framework continues to provide substantial benefits for domestic U.S. solar production and indirectly boosts demand for compliant, non-Chinese inputs such as wafers.
- FEOC rules[2] restrict the use of materials/inputs from countries of concern, including China.
- Tariffs[3] remain in place to protect domestic solar manufacturing from low-cost imports, primarily from China and SE Asia.
- Additional FEOC-linked tariffs[4] as a result of the Section 232 investigation on polysilicon imports are being proposed to further raise costs for non-compliant suppliers.

Impact on the U.S.

- These policies **strengthen the U.S. solar supply chain** for key inputs – including polysilicon, wafers, and cells – reinforcing the shift away from Chinese sourcing.
- The combined effect of tariffs, FEOC restrictions, and IRA incentives is **rapid expansion of U.S. solar cell and module capacity.**
- However, since the U.S. currently **lacks sufficient wafer production**, there is a **critical upstream supply gap** that constrains full domestic solar manufacturing.[5,6]
- This upstream shortfall is now viewed as a strategic vulnerability, driving early efforts to build or source compliant wafer capacity from allied nations.

Strong advantages for Stellar PV

- **FEOC-compliant:** Australian ownership ensures compliance and avoids penalties.
- **Tariff-advantaged:** Non-Chinese origin gives Stellar PV wafers a clear pricing advantage as tariffs on FEOC suppliers rise .
- **Market pull from U.S. expansion** – Rapid growth in U.S. cell and module lines increases demand for secure, compliant wafer supply.
- **Trusted trade partner:** Australia–U.S. trade ties strengthen Stellar PV's positioning as a long-term, transparent supplier of clean wafers.
- **Reduced trade risk:** Tariffs and FEOC enforcement create an opportunity for Stellar PV wafers to enter the U.S. market with reduced trade risks compared to Chinese and SE Asian competitors.

1. Infolink Group (2025)
2. Norton Rose Fulbright (2025)
3. Infolink Group (2024)
4. PV Tech (2025)
5. SEIA (2025)
6. Clean Energy Associates (CEA) (2025)
Full reference details available in the Appendix

EU Wafer Market – Competition and Opportunity

While Stellar PV's primary offtake focus is the United States, the company continues to engage with select European cell manufacturers to maintain flexibility and visibility in the region as a non-Chinese wafer supplier.

01

Wafer production in Europe
Growing from 2 GW to possibly 25 GW.

02

Cell production in Europe
Growing from 6 GW to possibly 43 GW.

Current wafer production

- Within the European region, Kalyon PV (Turkey) is the only operational integrated ingot-to-module producer, with a reported capacity of 2 GW covering ingot, wafer, cell and module manufacturing.[1]

Planned wafer production

- Sunwafe (Spain) aims to build a silicon wafer factory in Asturias with a target capacity of 20 GW by 2030.[2]
- CARBON (France) is establishing a vertically-integrated "gigafactory" in Fos-sur-Mer, with a capacity of 5 GW across ingots, wafers, cells and modules, with planned production from 2028.[3]
- NexWafe (Germany) is constructing a commercial wafer production facility in Bitterfeld, with a modest initial capacity of 50 MW[4]. Non Cz process (Epitaxial wafer growth).

Current cell production

- Approximately 6 GW of cell production capacity exists within the wider European region, primarily located in Turkey, with other facilities distributed across the EU (Italy, Germany, Hungary).

Planned cell production

- HoloSolis (France) is constructing a 5 GW solar cell and module factory in Sarreguemines[5], positioned among Europe's largest planned facilities. The plant will focus on high-efficiency TOPCon technology under recently granted manufacturing licences.
- CARBON (France): 5 GW integrated cell and module factory under development at Fos-sur-Mer.[3]
- Overall, announcements have been made of up to 43 GW of cell production, however it is unlikely that all of these factories will be stood up.

1. Kalyon (2025)
2. Sunwafe (2025)
3. Carbon (2023)
4. Nexwafe (2025)
5. PV Magazine (2025)

Full reference details available in the Appendix

EU Regulatory and Market Environment

"Made in Europe" and strategic policy direction

"Made in Europe" describes the EU's push to strengthen domestic manufacturing across key sectors, including clean-tech. This ambition is reflected across multiple policy instruments that collectively shape the regulatory and market framework for solar PV manufacturing and upstream suppliers.

- Net-Zero Industry Act (NZIA) – sets a target that 40% of the EU's annual deployment needs for net-zero technologies (including solar PV) should be met by domestic manufacturing capacity by 2030.
- NZIA resilience rules – cap the value of imports sourced from any single third country at <50% in EU-funded procurement, effectively favouring diversified, non-Chinese supply chains.
- NZIA non-price award criteria – mandatory non-price criteria in public tenders and auctions, elevating sustainability, traceability and supply-chain resilience in contract evaluation.
- Ecodesign for Sustainable Products Regulation (ESPR)– introduces sustainability, carbon-footprint, material disclosure and circularity requirements for products including PV modules, incentivising low-emissions and traceable upstream inputs, including wafers.
- EU Batteries Regulation (from Feb 2027) – introduces a Digital Battery Passport, requiring battery manufacturers to provide verified data on sourcing, production, carbon footprint and material composition across the full lifecycle. While limited to batteries, it provides a model likely to be mirrored for renewables under ESPR.
- Foreign Subsidies Regulation (FSR) – imposes strict scrutiny of non-EU state-backed financing, favouring suppliers with transparent, independent ownership.
- Green Deal Industrial Plan and Clean Industrial Deal – €100+ billion mobilised to fund clean manufacturing and tech innovation in the EU.
- Strategic Technologies for Europe Platform – directs EU financing toward critical technologies, including solar PV, to accelerate domestic capacity.

Tariffs and duties

Silicon solar wafers enter the EU duty-free and are not subject to anti-dumping or countervailing measures.

01

Impact on EU manufacturing

- NZIA benchmarks imply ~30 GW of EU solar manufacturing capacity by 2030, creating strong demand for compliant upstream suppliers.
- Increasing diversification away from highly concentrated Chinese supply is reshaping procurement preferences and opening opportunities for non-Chinese producers.
- Heightened sustainability and supply resilience criteria create premium market segments for low-emissions, transparent wafer suppliers.

02

Impact on Australian wafer manufacturing

- Strong strategic positioning as an Australian wafer supplier aligned with EU diversification and resilience objectives.
- Clear Australian value-add and transparent financing are essential to avoid foreign state influence under EU Foreign Subsidies Regulation.
- Likely to benefit from procurement preferences, funding opportunities, and sustainability scoring.

The Australian Government's Support of Solar Manufacturing in Australia

Australia's renewable energy policies combine **federal funding, concessional finance, and state-based initiatives** to build sovereign solar manufacturing capability. With ARENA, NRF, CEFC, and NAIF support, alongside the Queensland Energy Roadmap 2025 and the Transforming Queensland Manufacturing Strategy 2025–30, the policy environment strongly favours large-scale solar projects that can deliver jobs, investment, and decarbonisation outcomes.

The **Australian Government** places renewable energy at the core of climate and industry policy, with Clean Energy Manufacturing a flagship under the **Future Made in Australia** agenda. The focus extends beyond decarbonisation to **job creation, regional growth, and securing critical supply chains.**

01

Future Made in Australia
Strong federal and Queensland support creates a favourable environment for large-scale solar manufacturing, combining funding, policy, and infrastructure.

02

CAPEX and production credits
Stellar PV is planning to apply for production credits and CAPEX funding under the Solar Sunshot program.

Australian Government focus

Solar PV is a priority area under the Clean Energy Manufacturing flagship of the **Future Made in Australia** agenda, which aims to capture more value from Australia's resources and strengthen critical supply chains.

By supporting domestic manufacturing of ingots, wafers, cells, and modules, government policy seeks to reduce dependence on imports, improve energy security, and establish a globally competitive solar industry.

Ministers and agencies such as ARENA consistently emphasise that Australia should not just export raw resources but develop high-value manufacturing capacity.

The focus is dual: achieving decarbonisation targets while driving job creation, innovation, and regional growth.

Government funding

A strong funding framework supports solar manufacturing in Australia.

ARENA provides early-stage grants through programs like **Solar Sunshot**, de-risking feasibility and engineering studies while attracting private co-funding.

The National Reconstruction Fund (**NRF**), a $15 billion investment vehicle, offers co-investment in renewable and low-emissions technologies, directly targeting solar supply chain development.

The Clean Energy Finance Corporation (**CEFC**) supplies concessional finance and debt solutions to accelerate project deployment.

The Northern Australia Infrastructure Facility (**NAIF**) provides funding for enabling infrastructure such as power, water, and site works.

QLD Government support

The **Queensland Energy Roadmap 2025**, promotes affordable, reliable, and sustainable energy while attracting private investment in new generation and storage. It supports large-scale solar and battery projects through its **Regional Energy Hub** framework and **Queensland Energy Investment Fund,** creating opportunities for precincts like our site to access co-funding or partnerships for co-located solar/BESS projects.

The state actively supports advanced manufacturing and renewable industry growth through funding programs, approvals facilitation, and investment support delivered by **Trade and Investment Queensland** (**TIQ**) and the **Department of State Development**, driving regional growth and high-value jobs.

The **Transforming Queensland Manufacturing Strategy 2025–30**, prioritises innovation, export growth, supply-chain resilience, skilled regional workforces, and streamlined regulation – objectives that are strongly aligned with Stellar PV's vision for a sustainable, globally competitive clean-energy base in North QLD. The associated **Transforming Queensland Manufacturing Grants Program**, together with the **Made In Queensland** initiative further illustrate Queensland's ongoing commitment to advanced manufacturing.

03. Our Solution: Project Clean Wafers

Our Solution

Stellar PV's Project Clean Wafers is developing plans to build a 2 GW solar ingot and wafering factory near Townsville, Queensland.

The factory will use renewable energy, use fully traceable inputs, and be built around rigorous sustainability and governance practices.

Our product will be highly favourable to U.S. and EU customers due to our Australian location, ownership structure, and strong ESG performance.

Key principles guiding our project include:

High ESG standards	Focus on sustainability, using renewable energy and a fully auditable, transparent supply chain.
Advanced automation	Utilising cutting-edge technology to create an efficient and highly automated factory. We're planning to improve efficiencies even further through R&D.
Ultra low-cost solar	Low-cost renewable energy powering the factory and high automation levels drive lower costs of production.
Chinese expertise	Leveraging China's technical expertise, by collaborating with technology suppliers and factory design experts, allows Stellar PV to optimise factory efficiency and train local staff for long-term operation.
Global opportunity	Our strong relationships with global cell manufacturers position Stellar PV to secure offtake agreements and premium pricing through clean, traceable production in Australia.

01

Tariffs and trade restrictions
Restrictions on Chinese and SE Asian producers are boosting demand for alternative supply of high-quality wafers.

02

Unique opportunity for Australia
Our competitive advantages mean Australian production is favourably placed to supply into the U.S. and EU markets.

Proposed Ingot and Wafer Manufacturing Facility

Stellar PV's proposed ingot and wafer manufacturing facility represents a high-impact opportunity to localise one of the most value-creating stages of solar production, capturing capability and economic benefit currently sent offshore.

Location and Site Information:

- Strategically located near Townsville, Queensland.
- **Land area/site size:** Approximately 10 ha with potential to extend.
- **Zoning classification:** High Impact Industrial Zone.

Facility Projections:

- **Production capacity:** 2 GW Wafers
- **Construction jobs:** 400+
- **Permanent jobs:** 300+

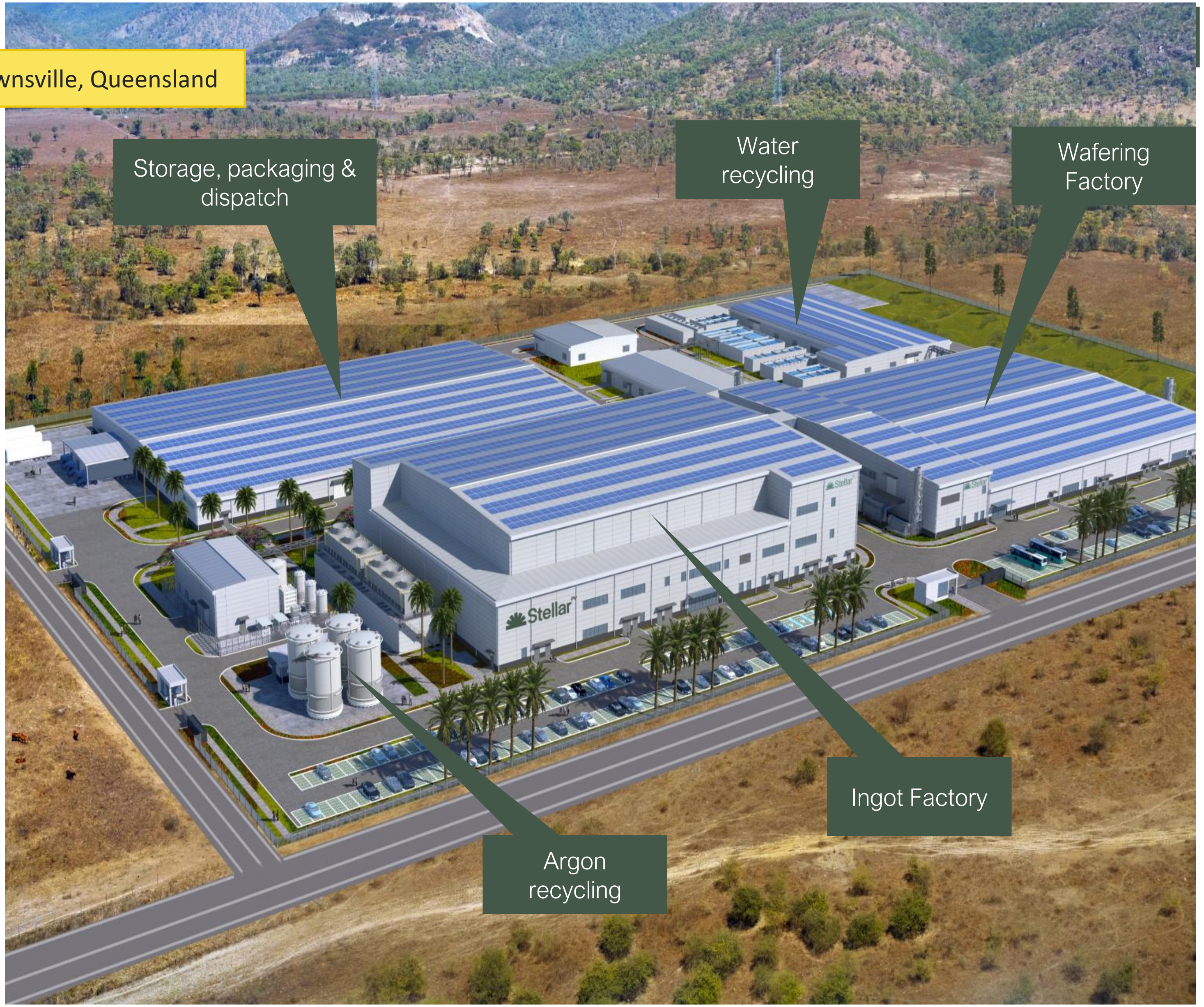


Image: Conceptual render on aerial site view showing the proposed facility and key zones.

Project Stages

The project is being progressed in two structured stages, supported by ARENA funding and third-party contributions.

Stage 1

Pre-Feasibility Review

A preliminary review assessing the technical, commercial, environmental and regulatory viability of establishing a solar ingot and wafer manufacturing facility in Townsville, Queensland.

Stage 1 included early factory design and costing in collaboration with equipment suppliers and design partners, site studies, and initial financial modelling to support fundraising and the next phase of development.

The review also undertook market analysis and engagement with potential offtake partners, and commenced ESG and community benefit planning.

Stage 1 is now complete.

Stage 2

Feasibility Study and FEED

A front-end engineering design (FEED) and detailed feasibility study to validate factory layout, process flows, and operational requirements for the proposed facility.

Stage 2 will also include preparation and submission of Development Applications, supported by environmental assessments, geotechnical investigations, and planning approvals for the site.

In parallel, Stellar PV will progress community and First Nations engagement, refine financial modelling and risk management, and continue negotiations toward formal offtake agreements to inform final investment decisions.

Stage 2 will be completed during 2026.

Key Achievements to Date

The Pre-Feasibility Review has delivered several key achievements that position the project to move confidently to the Stage 2 Feasibility Study and Front-End Engineering Design.

01

Site, Planning and Concept Design

- Land optioneering completed.
- Desktop assessment and constraint mapping of the proposed site.
- Option to lease secured for the preferred site near Townsville, Queensland. Townsville City Council is progressing precinct development works, including road access and water connections.
- Ecological surveys completing in December, which will inform Material Change of Use (MCU), Development Application (DA) and Environment Protection and Biodiversity Conservation (EPBC) referral.
- Initial electricity supply strategy developed, including assessment of renewable and behind-the-grid options.
- Early-stage conceptual factory design completed, outlining process flows and indicative facility layout.

02

Technical and Commercial Progress

- Stellar PV is assisted by a tier-1 silicon ingot manufacturer, leveraging their extensive industrial experience and proven operational capability, along side top Chinese and Australian designers, engineers and OEMs to ensure the factory is built to the highest industry standards and efficiencies.
- Key equipment suppliers have been shortlisted for ingot, wafering and supporting systems.
- Stellar PV have secured a Letter of Intent (LOI) from a U.S. cell manufacturer for the supply of up to 1 GW of silicon wafers, demonstrating a credible pathway to delivering product into the U.S. market and supporting supply chain resilience.
- A detailed preliminary financial model has been developed, integrating assumptions on capital costs, operating parameters, and market pricing to assess overall project viability and guide investment planning.

03

Community, ESG and Strategy

- Initial Community Engagement and Benefits Plan (CEBP) developed, including planning for First Nations engagement.
- Early ESG and traceability principles established to guide responsible supply chains.
- Early marketing and PR activities to support investor engagement.

Market leadership position

Stellar PV's reputation is built on a world-class team with global PV manufacturing experience across China, the U.S., Europe, and Taiwan, boosting credibility with customers and investors who value Australian-made, ESG-compliant products.

First-mover advantages

- Stellar PV holds the first-mover advantage as Australia's first commercial-scale silicon ingot and wafer manufacturing facility.
- Entering the market ahead of potential competitors enables the company to establish early customer relationships, develop operational expertise, and shape the emerging domestic solar manufacturing landscape.

01

Global policy timing

Timely leverage of U.S. tariffs on Chinese wafers and foreign-entity of concern (FEOC) restrictions, and EU supply chain diversification policies, opening export access for non-Chinese suppliers; Australia is seen as a favoured partner.

02

Government support

Stellar PV has received $4.7 million funding under the Australian Government's Solar Sunshot program – a $1 billion initiative led by ARENA.

Stellar PV has been identified as a lead candidate for CAPEX and production credit funding.

03

Operational learning curve

Early operational experience provides time to optimise manufacturing processes, improve yields, and reduce unit costs before competitors enter the market.

04

Industry voice

Early market presence provides platform to contribute to emerging Australian solar manufacturing standards and policy development.

04. Technology & Expertise

From polysilicon to wafer: overview of the ingot and wafering process

Our proposed 2 GW facility will transform high-purity polysilicon into high-quality monocrystalline silicon wafers using proven manufacturing processes optimised for large-scale solar production. The following pages give an overview of the main production stages in the ingot and wafering process.

Three Main Production Stages

1. **Czochralski (Cz) Monocrystalline Silicon Ingot Growth –** Converting polysilicon into high-quality single-crystal cylindrical ingots Converting polysilicon into high-quality single-crystal cylindrical ingots via the ***Recharge Czochralski (RCz)*** **process** – the modern, semi-continuous form of the Cz method.
2. **Square Ingot Processing –** Shaping the cylindrical ingots into square bricks.
3. **Wafer Slicing –** Precision cutting of the bricks into thin silicon wafers, ready for solar cell fabrication.

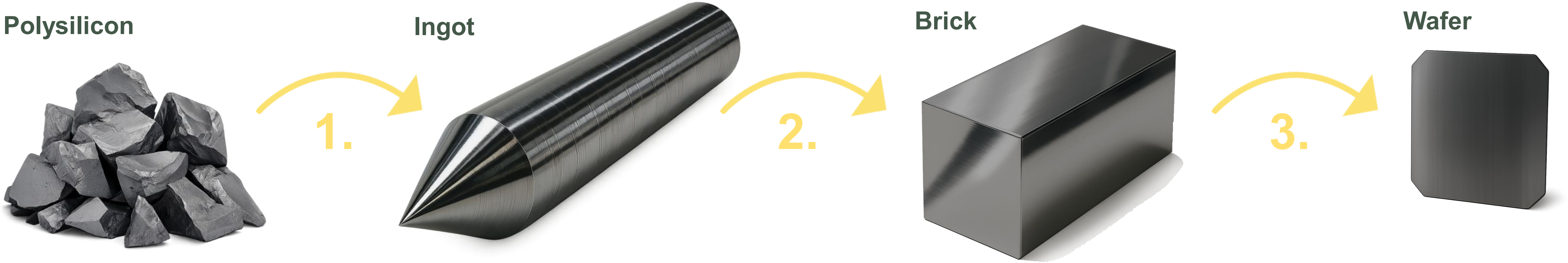


Image: Key steps in wafer production — polysilicon is melted and crystallised into a monocrystalline ingot (1), squared into a block (2), and sliced into wafers (3).

Proven technology: Recharge Czochralski (RCz) method – The gold standard

Czochralski (Cz) method for monocrystalline silicon ingot growth.

Invented by Jan Czochralski in 1916,[1] adapted for silicon crystal growth in the 1950s[2], and extensively refined by Chinese manufacturers over the past 25+ years, the Cz method has become the dominant global approach for growing silicon ingots for solar cells.[3]

In modern PV manufacturing, “Cz” refers not only to the original process but to a family of closely related industrial variants – including magnetic-Cz, continuous Cz, and recharge-Cz – that all share the same fundamental crystal-pulling principal and what the industry universally refers to as “Cz wafers”.

Proven and Scalable

The RCz method is a commercially mature process used to produce >95% of the world’s monocrystalline silicon for solar cells.[3] RCz systems enable refilling of the crucible with fresh polysilicon between growth runs without cooling the crucible, improving melt utilisation, reducing downtime and minimising crucible waste.

Technological stability

RCz has outcompeted specialised alternatives, displaced mainstream technologies and prevented emerging approaches from gaining commercial viability, offering stable output, predictable performance, and broad compatibility with existing manufacturing processes.

High purity and uniformity

The RCz method reliably delivers the crystal quality and dopant distribution required for high-efficiency solar cells, including PERC, TOPCon, HJT, and next-generation tandem technologies.

Global alignment

Nearly all major solar manufacturers—across China, the U.S., Europe, Korea, and India—have standardised around Cz wafers, ensuring supply chain compatibility and downstream customer confidence.

Image: Czochralski (Cz) ingot puller, where high-purity polysilicon is melted and slowly drawn into a monocrystalline silicon ingot.

1. Czochralski, J. (1918)
2. Teal, G. K., & Little, J. B. (1950)
3. ITRPV (2025)

Full reference details available in the Appendix

Silicon Feedstock

Silicon feedstock (or silicon charge) used in the factory comes from two sources:

1) Purchased pre-cleaned polysilicon loaded directly into the Cz ingot-pulling furnaces, and
2) Silicon heads, tails and edge material from ingot squaring are recovered and recycled, passing through the Material Preparation Unit before being returned to the furnaces. By recovering silicon internally, the factory reduces waste and supports a more circular and resource-efficient production cycle.

Material Preparation Unit (for recycled silicon):

1 Sorting Section

Recycled silicon (heads, tails, edges) is tested and classified using resistivity meters based on production requirements.

2 Chemical Etching and Rinsing

Automated cleaning using a standard semiconductor chemical etch to remove native silicon dioxide (SiO_2) layers and metallic impurities from silicon surfaces. The bath contains 5% by volume hydrofluoric acid (HF), 3% hydrochloric acid (HCl), and 92% deionised (DI) water, with ozone (O_3) bubbled through the solution.

3 Ultrasonic Cleaning

10-15 minutes using pure water to remove residual surface impurities, followed by pure water rinsing.

4 Drying and Storage

Silicon is dried using heated clean dry air (CDA) (115 °C for 30 mins), then sorted, packaged, and stored.

Image: Polysilicon chunks used as feedstock for ingot-growth.

Crystal-pulling/Ingot-growth process

Process Description: Polysilicon is melted in a high-purity quartz crucible within a cylindrical thermal system heated by graphite resistors. A seed crystal is inserted into the molten surface and slowly raised while rotating the seed crystal and crucible in opposite directions.

Critical Process Stages in the Crystal-Pulling Unit

1. Loading & Preparation
2. Vacuum Pumping & Melting
3. Seeding & Necking
4. Shouldering & Constant Diameter Growth
5. Tailing & Ingot Removal
6. Recharge Cycle (Multiple Ingot Growth)
7. Shutdown & Disassembly

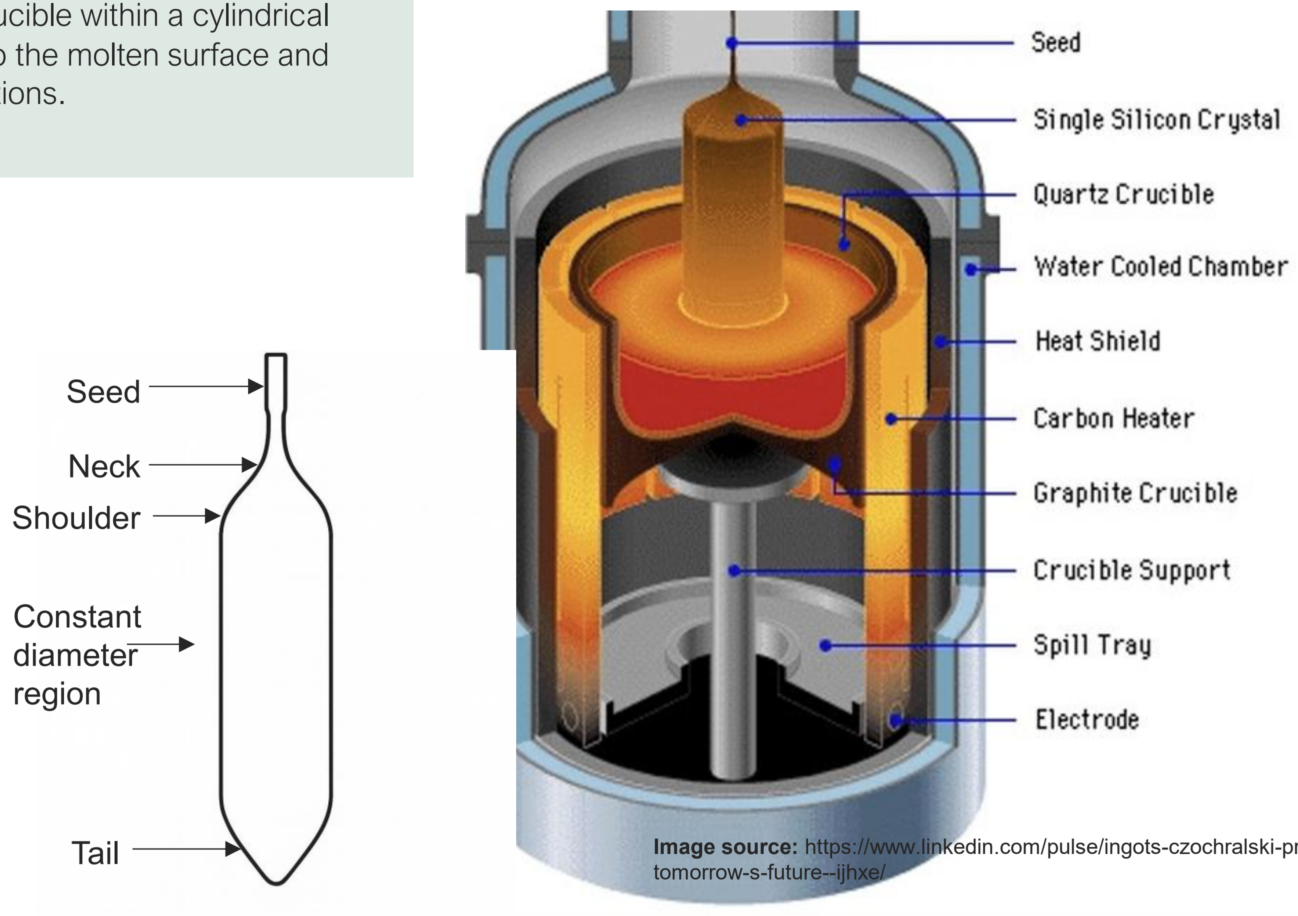


Image source: https://www.linkedin.com/pulse/ingots-czochralski-process-building-tomorrow-s-future--ijhxe/

Image: Schematic showing (left) the key parts of a monocrystalline silicon ingot and (right) the inside of a Cz ingot-pulling furnace during ingot growth.

Crystal-pulling/Ingot-growth process

1 Loading & Preparation

- Install graphite thermal field, quartz crucible, dopant, silicon charge and seed crystal.
- Silicon charge (~800-850 kg): resistivity-matched recycled silicon + pre-cleaned polysilicon with trace alloy dopants.
- Clean flanges and seals with ethanol-soaked lint-free cloth before closing furnace.

2 Vacuum Pumping & Melting

- Growth takes place in an Argon (Ar) vacuum to prevent oxidation.
- Ar is introduced from upper sub-chamber while mechanical pump exhausts from the lower main chamber.
- Pressure is maintained at 10-20 Torr.
- Cooling water is activated.
- Exhaust gases filtered and recycled via Ar recovery system.
- Electric heating melts silicon charge.
- Crucible rotated and raised to seeding position.

3 Seeding & Necking

- Seeding & necking establishes crystal orientation and eliminates dislocations.
- Controller switches to auto mode, adjusting rotation speeds.
- Seed crystal is lowered to ~20 mm above melt, preheated for 2 minutes, then dipped to initiate growth.
- Necking starts slowly, accelerating to 6-8 mm/min for a smooth, thin neck.
- Pull rate reduced to 0.5 mm/min for shouldering until diameter is ~10 mm below the target.

4 Shouldering & Constant Diameter Growth

- Shouldering controls the crystal diameter as it transitions from the neck to the target size.
- Pull rate is increased to ~2-2.5 mm/min until diameter stabilises at the target value.
- During constant-diameter growth, the crucible is slowly lifted upward to maintain a constant melt level as silicon is withdrawn into the ingot.
- When the remaining melt volume becomes low, the process transitions to tailing.

Image: A monocrystalline silicon ingot.

Crystal-pulling/Ingot-growth process

5 Tailing and Ingot Removal

- Tailing eliminates dislocations (reduces thermal stress and confines dislocations to the tapered tail region which is later discarded).
- Manual control is engaged: crucible lifting stops, pull rate increases to taper the crystal while preventing melt solidification.
- Ingot (~500 kg) is fully withdrawn into the upper chamber, while the melt remains fully molten in the main chamber.
- Valves are sealed, and the upper chamber pivots 90º to the unloading position.
- Ingot is then lowered and secured by a forklift-type jig for safe transfer and cooling.

6 Recharge Cycle (Multiple Ingot Growth)

- Several (~4 to 5) pre-filled quartz tubes (recharge cartridges), each holding ~100 kg of silicon charge are prepared beside the furnace.
- Each cartridge is inserted into the upper chamber which then pivots back into position over the main chamber and is sealed under Ar vacuum.
- Valves are opened, cartridge is lowered near the melt and a trap door releases the silicon charge. The empty cartridge is removed and this process is repeated for the remaining cartridges.
- After 4 to 5 hours, everything is molten and temperature stabilised, ready for seeding of the next ingot (back to Step 3).
- This process is repeated multiple times (typically 7 to 11) until the quartz crucible becomes worn or is at risk of breaking.
- Process then moves to shutdown.

7 Shutdown & Disassembly

- Sequential shutdown: crystal lifting/rotation, crucible rotation, cooling, Ar flow, vacuum pumping, power and water.
- Natural cooling takes ~7 hours.
- Atmospheric pressure restored with Ar or air.
- Crystal ingot extracted and placed on V-rack to cool.
- All components removed: heat shield, crucible, graphite supports, insulation, heating systems.
- Crucible fragments stored in quartz containers; residue collected separately.
- Internal parts, main/sub-chambers, and exhaust pipes are cleaned.
- Vacuum pumps cleaned every ~5 runs.
- Furnace reassembled in reverse order for next cycle.

Ingot Squaring

The squaring unit transforms cylindrical monocrystalline silicon ingots into square bricks suitable for wafer slicing.

1 Head/Tail Removal & Cutting

- Heads and tails of ingots are removed and returned to Material Preparation Unit for recycling.
- Ingots are vertically cut to the length required by wafer slicing equipment.

2 Inspection

- Cut ingots undergo inspection.
- Quality verification before proceeding to squaring.

3 Squaring & Rounding/Chamfering

- Squaring machine removes four longitudinal edge pieces from cylindrical ingots, to form square ingots with edge spacing matching solar cell specifications.
- Water is used as a coolant.
- Precision CNC grinding machines then slightly round the corners and smooth the edges, preventing breakage during slicing and handling.

Image: A monocrystalline silicon brick.

Wafer Slicing

Diamond wire sawing (DWS) is the industry-standard wafering method, having replaced older slurry-based sawing due to its higher precision, speed and efficiency. It now dominates global wafer production, enabling thinner wafers, lower silicon loss (kerf loss), and significantly reduced manufacturing costs.

1 Brick/rod Bonding

- The brick is bonded to a plastic board using AB adhesive.

2 Slicing

- The bonded brick and board are mounted to a cutting fixture and loaded into the wire cutting machine.
- Ultra-fine, high-strength diamond wires (up to 3000 in parallel) form a horizontal cutting web moving at 20-35 m/s.
- The brick is lowered into wires and sliced into thin wafers under water cooling.
- Wire speed and cooling water flow are adjusted based on the brick's shape.

3 Debonding/degumming

- Wafers (still bonded to the board) undergo pre-cleaning in purified water for 10 mins.
- Wafers are placed in heated pure water mixed with lactic acid to dissolve the adhesive, separating the wafers from the board.
- Wafers are placed into cassettes for cleaning.

4 Cleaning

- Wafers undergo pre-cleaning in a solution of potassium hydroxide (KOH), hydrogen peroxide (H_2O_2) and some additives, followed by cleaning in heated high-purity water with ultrasound to remove surface impurities.
- Heated clean dry air (CDA) is used to dry the wafers.

Image: A monocrystalline silicon wafer.

Our Wafer Product

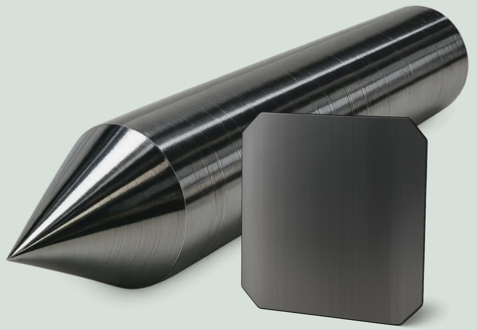


Image: A monocrystalline silicon ingot and wafer.

Australian made. Simply brilliant.

Manufacturing Technology Trends

As solar cell technologies evolve, our wafers are engineered to remain compatible with all major architectures and manufacturing processes – ensuring long-term alignment with global industry trends.

High-efficiency cell designs and large-format wafers	Next-generation technologies	Manufacturing process innovation
The market has seen a rapid shift to TOPCon and HJT cells for higher efficiency and lower system costs. Larger wafer formats M10 (182 mm) and G12 (210 mm) have become standard, reducing cost per watt and increasing module. Wafer thickness continues to decrease – now typically 130 µm - 150 µm thick – improving material efficiency and lowering production costs without compromising performance.	Tandem cells are set to become the next mainstream solar cell technology, with global manufacturers investing in commercial production. Silicon-based tandems will lead adoption, sustaining wafer demand. Perovskite/silicon tandems, now in pilot stage, are expected to reach 27% efficiency in mass production by 2027.	The Recharge Czochralski method drives improved crystal quality and yield, utilising AI for better results and enabling multiple ingot pulls per crucible through semi-continuous melt replenishment. Diamond wire sawing reduces kerf loss*, lowers costs, and increases throughput. Automation and MES enable precise control, predictive maintenance, and full traceability.

**Kerf loss is the loss of polysilicon when a cut is made through the polysilicon block to make wafers.*

01

Production output

Stellar PV will produce one type of high-efficiency wafer, likely to be M10 or G12, N-Type wafers. The final wafer size will be selected based on offtake partner requirements, with equipment capable of supporting both.

02

Cell compatibility

These wafers are suitable for all advanced cell designs and next-gen technologies.

A long history of Australian-Chinese collaboration and Stellar PV’s strategy

Global evolution of wafer technology

Wafer technology began with Bell Labs’ solar cell in the U.S. (1954), refined through NASA’s space programs and semiconductor silicon producers like Hemlock, and advanced further by German institutes and equipment suppliers in the 1980s–2000s before being transferred at scale to Asia.

UNSW (Prof. Martin Green) trained pioneers like Shi Zhengrong (Suntech), while leaders including Samuel Yang and Ted Szpitalak bridged early Australia–China partnerships that accelerated China’s PV scale-up.

From the early 2000s, companies such as Suntech and JA Solar drove China’s rapid scale-up, positioning the country as the global hub of wafer production.

China’s R&D and manufacturing edge

Chinese manufacturers led key Cz ingot innovations, including crucible silicon recharge (RCz), longer ingots, larger wafer formats and precise process control – all enabling higher yields, lower costs and efficient high-volume production.

Extensive automation, precision control systems and incremental process refinement produced unmatched consistency and cost leadership at scale.

Today, Chinese equipment suppliers own critical intellectual property, and supply the world’s most advanced ingot-pulling and wafering equipment.

Stellar PV’s strategy

Stellar PV is leveraging this deep global experience to build soverign capability in Australia.

We are collaborating closely with the Chinese design house (KIDE), and various OEM suppliers to ensure the factory utilises the latest, cutting-edge Chinese technology.

KIDE is a global EPC (Engineering, Procurement, and Construction) service provider for the global technology industry chain with 10 international branches and 250 GW+ of ingot/wafering facility design experience, working with Tier-1 manufacturers including LONGi, Jinko and JA Solar.

Stellar PV is also supported by a tier-1 silicon ingot manufacturer, bringing extensive industrial experience and proven operational capability to guide the factory’s design, equipment selection and commissioning.

Chinese experts will support the roll out of the technology by coming to Australia over the short and long term, to provide expert knowledge transfer and allow Stellar PV to rapidly upskill Australian staff.

Australia is supportive of skilled migration for advanced manufacturing, and the Townsville region has access to a favourable visa program that allows sponsorship of overseas workers under more flexible rules than standard skilled migration.

Key equipment suppliers

We have undertaken a comprehensive review of key equipment suppliers to ensure we are securing the best and most advanced technology for our facility.

This process has included detailed peer research, benchmarking across global best practice, and direct engagement with suppliers through face-to-face meetings, site visits, and technical due diligence. Our focus has been on selecting partners that are financially stable, proven in large-scale manufacturing, and committed to innovation and after-sales support.

While we have identified preferred suppliers, we have not yet executed contracts, as final pricing and terms will be negotiated closer to procurement to maximise value and flexibility.

01

Technical equipment
Ingot pulling and wafering equipment, argon recycling, water treatment and HVAC .

02

Automation
The factory will be highly automated with Automated Guided Vehicles (AGVs) transferring the heavy products around the factory with precision.

Image: Silicon ingot pulling section of a factory, where monocrystalline silicon ingots are grown using highly automated Cz pullers.

05. Strategic Location & Infrastructure

Highly Strategic Location

Sited within a leading Australian precinct dedicated to advanced manufacturing, processing, technology and emerging industries, the site enables reliable access to raw materials, renewable energy for production and port proximity.

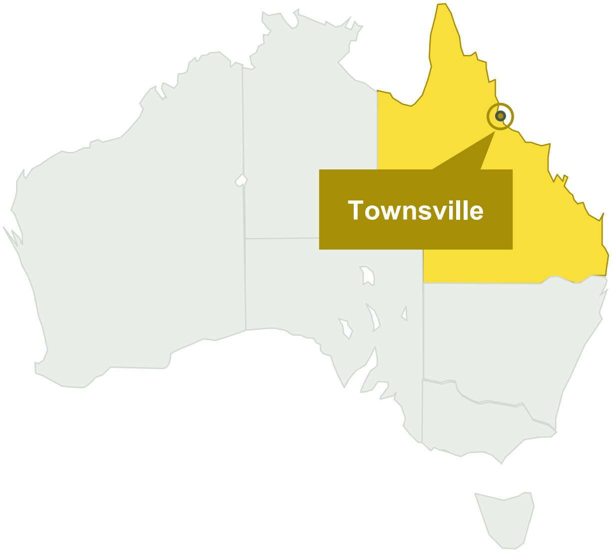


Image: Proposed location for Stellar PV's 2 GW ingot and wafering facility.

Strategic benefits of proposed location

1 Access to electricity and low-cost renewable energy

- Electricity is a key factor in location decisioning as Stellar PV will have high energy needs to run the Czochralski (Cz) ingot pullers.
- Strategically located near low-cost, renewable energy supply and BESS systems being developed by various proponents at the site.
- This combination of renewable energy production sits behind the grid, reducing transmission costs and load reliance on the Queensland grid supply.

2 Integration with local supply chain

- Other parts of the upstream value chain are located at or near the site, including Solquartz, who are developing multiple high purity quartz tenements within 300 km of Townsville, Queensland and are building a metallurgical silicon processing facility nearby.

3 Infrastructure, transport and logistics

- The site benefits from strong multi-modal transport links – including access to the Bruce and Flinders Highways, proximity to the deep-water shipping port and airports in Townsville, and planned freight rail connections. These enable efficient import of equipment and materials, and the export of wafers, supported by established industrial logistics providers in the region.

4 Supportive government partners

- The location qualifies Stellar PV for the Northern Australian Infrastructure Facility (NAIF) funding (i.e., above the Tropic of Capricorn) which can provide concessional CAPEX funding for the construction and development of the factory.

Regulatory, Environmental and Site Conditions Overview

A review of regulatory, environmental and site conditions has been completed to inform project feasibility. This work provides an early understanding of approval pathways, environmental sensitivities and physical site characteristics influencing layout and design.

Site and Geological Conditions

- Comprehensive land optioneering study completed.
- Desktop review of existing geological data for the region.
- Preliminary assessment of ground conditions and site suitability.
    - Preferred location confirmed with optimal ground conditions – flat, clear terrain suitable for large-scale industrial development.
- Detailed geotechnical and site investigations are planned for Stage 2.

Image: Stellar PV team conducting an initial walkthrough of the proposed site near Townsville, Queensland

Regulatory, Environmental and Risk Overview

- Planning and development approvals: preliminary review completed by GHD, including preparation of an Approvals Matrix identifying statutory approvals required to implement the project. The matrix outlines approval types and relevant legislation, administering authorities, approval triggers, indicative timeframes, supporting information, and associated approval risks.
- Environmental surveys: two ecological surveys completed.
- Community and stakeholder engagement: ongoing engagement with Townsville City Council and QLD State Development, Infrastructure & Planning; neighbouring industrial proponents of the site to support co-ordination of shared infrastructure.
- Initial risk identification of site-specific risks.
- Regulatory compliance alignment: preliminary assessment of relevant manufacturing, environmental and industrial regulations for a high-impact industrial facility.
- No regulatory, environmental or risk-related barriers have been identified that would prevent progression to Stage 2.

06. Sustainability & Community Impact

High ESG standards as a priority

Vision and Commitments

Environment

- Up to 80% renewable electricity, reducing Scope 2 emissions and operational costs.
- Circular resource use: excess polysilicon and water from the process is recycled and reused onsite.
- Prioritising locally sourced, lower-emission inputs where available.

Social

- Partnerships with Indigenous communities (UNDRIP-aligned) for shared value and measurable social benefits.
- Modern slavery prevention and ethical labour practices.
- Collaboration with local communities.
- Local job creation and inclusive hiring practices with targets for gender equity and Indigenous participation.
- Collaboration with universities, training providers and industry to build local capability and share best practices.
- Employee health and safety.
- Transparent communication with stakeholders.

Governance

- Ethical decision-making and strong board oversight.
- Supply chain traceability and supplier accountability.
- Climate risk disclosure (TFCD-aligned) and ESG risk management frameworks.
- Oversight through project steering committee.
- Alignment with UN Sustainable Development Goals.

Premium, ESG-aligned positioning

Stellar PV actively supports eight United Nations Sustainable Development Goals (UN SDGs) through responsible, low-carbon manufacturing and global supply chain transformation.

SDG 7 – Affordable and Clean Energy
- High-purity silicon wafers for global solar deployment.
- Powered by behind-the-grid renewable energy.
- Strengthening energy security and access to clean energy.

SDG 10 – Reduced Inequalities
- Diversifying global wafer supply beyond China.
- Strengthening industrial resilience for Australia and allied nations.
- Promoting equitable participation in the clean energy transition.

SDG 12 – Responsible Consumption and Production
- ESG-compliant supply chain from Australian quartz to wafer.
- Closed-loop systems for argon, water, and silicon reuse.
- Transparent sourcing and sustainable manufacturing.

SDG 5 – Gender Equality
- Inclusive hiring practices across all business units.
- Empowering women in engineering, operations, and leadership.
- Championing diversity in advanced manufacturing.

SDG 13 – Climate Action
- 80% of energy sourced from solar.
- Enabling widespread adoption of clean energy technologies.
- Direct contribution to emissions reduction and climate goals.

SDG 16 – Peace, Justice and Strong Institutions
- Fully traceable, ethical supply chain.
- Transparent ESG governance and audit-ready reporting.
- Aligned with international human rights and labour standards.

SDG 8 – Decent Work and Economic Growth
- Creating high-value jobs in regional Australia.
- Building local manufacturing capability and training.
- Supporting inclusive and sustainable economic development.

SDG 17 – Partnerships for the Goals
- Partnering with local polysilicon and quartz producers.
- Collaborating with international solar firms and policymakers.
- Enabling sustainable outcomes through global cooperation

Supply Chain ESG

At Stellar PV, we focus on pulling high quality ingots and slicing them into wafers. We are committed to bringing this crucial part of the process home, ensuring the transformation from raw materials to efficient, high-quality solar modules happens right here on Australian soil.

ESG-compliant, fully traceable supply chain	Advanced automation and efficiency	Global market fit and risk mitigation
• Source quartz from Australian mines. • Partner with local polysilicon processors if/when available. • Provide auditability from mine through to wafer. • Facility powered by renewable energy to support low-emissions manufacturing and meet key market sustainability expectations.	• Fully automated, high-throughput lines. • Closed-loop water recycling. • Process design incorporates proven learnings from leading Chinese manufacturers. • Silicon waste from ingot shaping is captured and recycled back into the melt process.	• Aligned with global tariff, reshoring and supply-chain diversification trends. • Positioned to supply U.S. and EU cell manufacturers seeking secure wafer inputs. • Supports growing demand for non-Chinese, transparent and ethically sourced solar materials. • Secure long-term offtake from global players.

Image: Rock quartz (left) is refined into polysilicon (right), which is then used to produce silicon ingots and wafers.

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Polysilicon Supply

1 Chinese polysilicon concerns

China is the world's largest producer of polysilicon, with a significant share originating from Xinjiang. International reports have raised concerns about supply-chain transparency, intensifying global expectations for stronger ESG, ethical, and compliance standards. This creates reputational, regulatory, and trade risks for downstream solar manufacturers, particularly under U.S. and EU import restrictions.

The pathway forward is the deployment of robust, transparent traceability systems – end-to-end audits, digital product passports, independent verification, and fully segregated supply chains. By certifying provenance from quartz to wafer, manufacturers can demonstrate ethical sourcing, safeguard market access, and strengthen customer and investor confidence.

2 U.S. supply considerations

Under the IRA/OBBBA, products remain eligible for tax credits if FEOC-sourced materials stay below Treasury's cost-share threshold.

Since most Chinese polysilicon falls into this category, using it risks disqualifying downstream solar products from IRA benefits, undermining competitiveness in the U.S. market.

By contrast, sourcing only non-FEOC polysilicon (from the U.S., Europe, Malaysia, or other compliant jurisdictions) supports access to these subsidies, protects customer offtake agreements, and de-risks future trade restrictions.

In practice, a non-FEOC supply chain not only meets compliance but strengthens market position at premium prices, ESG credibility, and long-term resilience.

3 Australian polysilicon manufacturers

Australia is actively exploring new polysilicon projects[1,2] to strengthen domestic solar manufacturing, leveraging its abundant renewable energy and proximity to critical minerals.

Local production offers clear benefits: lower transport costs, reduced carbon footprint, and enhanced supply chain security for downstream ingot and wafer facilities.

We would strongly consider integrating Australian polysilicon into our operations given these benefits and the alignment with national policy goals.

However, our project must remain viable regardless of local supply availability. By building a flexible procurement model that can operate with or without Australian polysilicon, we ensure competitiveness, resilience, and certainty for customers.

Key drivers in polysilicon supply strategy

01
U.S. non-FEOC supply
Supports IRA tax credits and market access by sourcing polysilicon from compliant, non-FEOC jurisdictions.

02
Traceability
Build trust and meet ESG standards with full end-to-end transparency and independent verification across the supply chain.

03
Cost
Balance compliance and sustainability with competitive sourcing strategies that keep production costs globally viable.

Global Polysilicon Supply: Key Producers and Annual Volumes

Country of ownership	Producer	Metric tonnes (approx)
China	Various	3.2 million [3]
Germany	Wacker	80,000 [4]
U.S.	Hemlock	33,000 [5]
South Korea	OCI (South Korea & Malaysia)	38,000 [6]
Oman	Ramping up 2025	100,000 [7]

1. Energus (2025)
2. Townsville City Council (2023)
3. Bernreuter Research (2025)
4. Wacker (2025)
5. PV Magazine (2025)
6. PV Magazine (2025)
7. PV Magazine (2024)

Full reference details available in the Appendix

Community Engagement and Benefits Plan (CEBP)

The **CEBP** for Stellar PV's Clean Wafers facility is designed to ensure meaningful, transparent, and ongoing engagement with local communities and First Nations groups, aligned with Australian Government solar initiatives. The plan emphasises community benefit, workforce development, and sustainable industrial growth, and aligns with the **Future Made in Australia Community Benefit Principles** by supporting secure local employment, inclusive workforce participation, and strengthened regional industrial capability.

Key objectives

Job creation and training

Provide safe, local employment with structured upskilling and career pathways.

Community and First Nations collaboration

Work closely with local stakeholders, particularly the Bindal People, ensuring shared decision-making and respect for cultural practices.

Strengthening local capabilities

Support resilient renewable supply chains and robust industrial capacity in the region.

Transparency and accountability

Maintain high standards of reporting, compliance, and independent oversight throughout the project lifecycle.

Community negotiation and engagement

Community engagement

Proactive, inclusive engagement through meetings, site visits, correspondence, and public information channels.

First Nations engagement is led respectfully, with local consultants guiding culturally appropriate interactions.

Monitoring and reporting

Feedback mechanisms, reporting frameworks, and independent oversight ensure agreed outcomes and benefits are tracked and delivered.

Stellar PV's Upskilling Strategy

Stellar PV is committed to an inclusive workforce that supports First Nations participation and people of all genders and identities.

Upskilling Initiatives

- **Local Workforce Targets:** 60–70%+ of construction roles and 40%+ of operations recruited from Queensland/Townsville.
- **TAFE & University Partnerships:** Apprenticeships, traineeships, structured career pathways and participation in university-led training hubs and R&D initiatives.
- **Mentorship Programs:** Pairing experienced operators and engineers with early-career employees.
- **15+ Annual Scholarships:** Engineering, environmental science, and skilled trades.
- **On-Site Training Facility:** Hands-on learning and continuous professional development.

Employment, First Nations and Gender Inclusion

- **300+ Permanent Operational Jobs:** Award or above-award wages, secure long-term contracts, and clear progression pathways.
- **First Nations Employment Strategy:** Culturally appropriate recruitment, onboarding, and sustained support for First Nations job seekers.
- **Inclusive Workforce Practices:** Supporting people of all genders, backgrounds, and identities through equitable hiring, safe, respectful environments and targeted initiatives to improve representation.
- **Comprehensive Support Framework:** Strong workplace safety culture, mentorship for retention, and structured cultural-safety initiatives.
- **First Nations Leadership Pathways:** Pathways to next-generation First Nations leadership across engineering, operations, and renewable-energy careers.

07. Competitive Position & Economics

Australia's Competitive Advantage

Stellar PV's business model is built on competitive fundamentals: efficient operations, low-cost Australian energy, and strategic market positioning enable us to compete against both U.S.-produced wafers and Chinese imports.

1 Australia's competitive positioning

- **Global reset:** Chinese manufacturers have historically sold below cost, distorting global markets. As these subsidies normalise, baseline import prices will rise.
- **U.S. disadvantage:** Despite generous federal support, U.S. manufacturers face structural cost disadvantages, with total employment costs up to 30% higher than Australia once healthcare and on-costs are included.
- **Energy parity**: Competitive renewable-electricity pricing and access to behind-the-meter supply place Australia on cost parity with leading U.S. manufacturing states.
- **Strong PV heritage:** Australia's long standing PV collaboration with China has built deep technical expertise and industry relationships, which can now be leveraged to develop an independent, trusted manufacturing base.
- **Trade advantage:** Lower tariffs across the supply chain give Australian production a cost advantage over U.S. and Asian competitors.

Production credits under Solar Sunshot would support competitive cost of production and strong investment returns.

2 Production credits: global context

- The U.S. provides $12 USD per m^2 in production tax credits under the Inflation Reduction Act (equivalent to **~$0.51 USD per wafer**), setting a benchmark for manufacturing support in developed markets.
- **Australian production credits** don't need to match U.S. levels to deliver strong returns. Even at more modest rates, the impact on Stellar PV's economics is substantial:
  - Significantly enhanced profit margins across the project life.
  - Reduced payback periods and improved rate of return for investors.
  - Competitive insulation against volatile import pricing and subsidy wars.

Preliminary Financial Model Development

The project's financial model has been developed in collaboration with Pitcher Partners, incorporating detailed assumptions on capital expenditure, operating costs, production efficiency, polysilicon pricing, and wafer offtake values.

Total project CAPEX is estimated at approximately **$400 million**, including land, site infrastructure, utilities, major equipment, construction and commissioning. This estimate has been benchmarked against comparable international wafering projects.

The model enables scenario testing and sensitivity analysis for key variables such as energy pricing, yield, and input costs, ensuring robust assessment of commercial viability.

The pre-feasibility model indicates that the facility is economically feasible based on current assumptions, supporting progression to the Stage 2 Feasibility Study and FEED for more detailed validation.

Total project CAPEX $400+ million
Includes land, site infrastructure, utilities, major equipment, construction, and commissioning. Benchmarked against global wafering projects.

08. Conclusion

Conclusion

Project Clean Wafers marks a shift in how Australia participates in the solar value chain. For many years Australia has shipped quartz and metallurgical silicon overseas, only to buy back the high-value components in the form of solar cells and modules. Building ingot and wafer capability allows Australia to keep more of that value at home, and complements emerging efforts to develop domestic polysilicon production, moving Australia closer to a more complete and traceable clean-energy supply chain.

Preliminary findings from Stage 1 indicate that establishing Australia's first large-scale ingot and wafer facility is technically feasible and commercially promising. Early assessments of the process design, equipment options, site requirements and ESG commitments provide a sound basis for progressing to detailed engineering studies in Stage 2.

The market case is also strong. U.S. and EU manufacturers are actively looking for non-FEOC, ESG-aligned wafer supply, and both regions face a growing shortfall as their cell and module capacity expands. Australia's low-cost renewable energy, trusted trade position and supportive policy settings give us a clear advantage in meeting this demand.

With production credits and CAPEX support, our early findings indicate the project can achieve globally competitive pricing, deliver high-value regional jobs and sovereign capability, and relieve one of the most significant chokepoints in the global clean-energy supply chain.

Overall, Stage 1 suggests that Project Clean Wafers is well aligned with Australia's industrial and clean-energy ambitions and is positioned to move confidently into Stage 2. Stellar PV is well placed to contribute to a more resilient global supply chain while helping to develop a robust domestic solar manufacturing ecosystem.

09. Appendix

Glossary

Term	Definition
ARENA	Australian Renewable Energy Agency – Government agency funding renewable energy innovation in Australia.
CAPEX	Capital expenditure – upfront investment required to purchase, build or upgrade long-term assets such as equipment, facilities and infrastructure.
CEFC	Clean Energy Finance Corporation – an Australian Government-owned “green bank” that invests public capital into clean energy and decarbonisation projects to help Australia reach its emissions-reduction and net-zero targets.
Czochralski (Cz) Method	Standard industrial process for producing high-purity monocrystalline silicon ingots.
DA	Development Application – a formal request to local council or planning authority for permission to carry out development on land, such as constructing, altering, using, or subdividing buildings or sites.
EPBC Act	Environment Protection and Biodiversity Conservation Act – Australia’s main national environmental law that regulates activities which might significantly impact matters of national environmental significance, such as threatened species, important habitats, and World Heritage areas.
ESG	Environmental, Social, and Governance – standards for responsible business practices.
ESPR	Ecodesign for Sustainable Products Regulation – a European Union law that creates a common framework of design rules to make almost all physical products placed on the EU market more sustainable, circular, and resource-efficient throughout their whole life cycle.
FEED	Front-End Engineering Design – early-stage engineering to define project scope and reduce risks.
FEOC	Foreign Entity of Concern – a classification used in recent U.S. clean-energy and industrial policy to identify companies or entities that are owned by, controlled by, or subject to the jurisdiction of certain governements, including China, Russia, Iran, and North Korea.
FSR	Foreign Subsidies Regulation – a European Union law that allows the European Commission review and address subsidies granted by non-EU governments to companies operating in the EU, when those subsidies risk distorting competition in the EU internal market.
G12 wafer	The “G” series denotes full-square, larger wafers; G12 corresponds to a side length of about 210 mm.
G7	Group of Seven countries – Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

Glossary

Term	Definition
GW	Gigawatt – a unit of power equal to one billion watts, or 1,000 megawatts
HJT	Heterojunction (with intrinsic thin layer) Technology – a solar cell architecture that combines a monocrystalline silicon wafer with ultra-thin amorphous silicon layers on both sides, forming a “heterojunction” that reduces surface and contact recombination and improves conversion efficiency.
IRA	Inflation Reduction Act – a major 2022 US law focused on climate, energy, healthcare, and tax policy.
LOI	Letter of Intent – A non-binding document where parties outline their intention to enter into a future, formal agreement (such as an offtake agreement)
M10 wafer	Monocrystalline silicon wafer format denoting a side length of approximately 182 mm.
MCU	Material Change of Use - when the way land or buildings are used changes in a significant (material) way, typically triggering the need for a development approval.
MES	Manufacturing Execution System – software for real-time tracking and control of production and quality.
MOU	Memorandum of Understanding – a formal, non-binding agreement signalling commercial intent.
NAIF	North Australia Infrastructure Facility – an Australian Government financing body that provides concessional loans to help develop economic infrastructure in northern Australia.
NRF	National Reconstruction Fund – is an Australian Government investment fund designed to support and grow the country’s industrial and manufacturing capability, especially in priority sectors like clean energy, advanced manufacturing, and critical technologies.
NZIA	Net-Zero Industry Act – a European Union law that creates a simplified regulatory framework to scale up manufacturing of clean “net-zero” technologies inside the EU and support its 2030 and 2050 climate goals.
OBBBA	One Big Beautiful Bill Act – a 2025 U.S. budget reconciliation law that revises major elements of the Inflation Reduction Act’s tax and energy framework, including the introduction of stricter Foreign Entity of Concern (FEOC) rules and reduced support for certain renewable-energy incentives.
PLI	Production Linked Incentive – an Indian set of government schemes that pay companies a cash incentive based on incremental sales of goods manufactured in India.
PV	Photovoltaics – the science and technology of converting sunlight directly into electricity using semiconductor materials

Glossary

Term	Definition
RCz	Recharge Czochralski process – a modern variant of the Cz method used by >95% of manufacturers globally. RCz pullers enable refilling of the crucible with fresh polysilicon between growth runs without cooling the crucible, improving melt utilisation, reducing downtime and minimising crucible waste.
TIQ	Trade and Investment Queensland – the Queensland Government's dedicated global business agency for international trade and investment.
TOPCon	Tunnel Oxide Passivated Contact – a crystalline silicon solar cell architecture with an ultra-thin "tunnel" oxide layer topped with a doped polysilicon contact, which reduces electron recombination and boosts efficiency, often enabling cell efficiencies in the mid-20% range in commercial production.
UN SDGs	United Nations Sustainable Development Goals – a set of 17 global goals adopted by the United Nations to promote sustainable development across environmental, social and economic dimensions.

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